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THE SALT AND GAS WELLS OF CHINA.

By E. H. PARKER.

ONE of the most remarkable industries in the world is the salt factory of Tsz-liu Tsing, on a branch of the Upper Yang-tze River, in Western China. The name means 'self-flowing wells,' and refers to their peculiar capacity for supplying both the raw material itself and the fuel for preparing the material—salt brine and natural gas—at one and the same time. It would be of very little use to say what towns they are near, as all topographical names in that region are equally unknown in Europe; but their exact situation is in north latitude $29^{\circ} 30'$, and longitude 105° east of Greenwich, about thirty English miles from the walled city of Fu-shun. I visited them in 1881, and at that time certainly not half-a-dozen Europeans in all had even seen them, not to say accurately described them.

The number of wells in actual working is about five thousand; but for official purposes—that is, squeezing and corruption—they are reported at a quarter of that figure; and the area under active operations covers, perhaps, four or six square miles. One of the first things that attracted my attention, as I strolled amongst the works, was a man leisurely tapping the rock with a heavy steel weight suspended from a framework by strips of bamboo, to which it was firmly attached: he had already done a little over two inches, having only begun the day before. A little farther on, I saw a similar hammer being raised by a youth from a well mouth not more than six inches in diameter. This man said his grandfather had commenced the work, which had gone on uninterruptedly through the life of his father, and was now in its seventieth year. Two inches of rock are an average day's work, which, at three hundred days a year, would make fifty feet, or half a mile for the seventy years. But, of course, that was an exception, and he had suffered accidents. As a rule, bottom, or rather absence

of bottom, is reached in anything between one and ten years, and the majority of the wells are between two thousand and three thousand feet deep. The weights or hammers are shaped like a closed fist, with two projecting knuckles, and the operator simply jabs this against the rock by leisurely raising and letting go the bamboo line. As the slush accumulates and deadens the effect of the hammer, it is hauled up in a bamboo bucket, that is to say, in a length of bamboo, fitted with a self-acting leather valve at the bottom, and about as bulky as a beer bottle: the weight of the descending bucket opens the valve, and allows the slush to run in: the moment the bucket is raised, the valve imprisons the slush. As the well gets deeper, the force of the human arm is insufficient to raise the hammer. A scaffolding is then built, and the man works a lever with his feet. A second man often assists to twitch the cord sideways, so as to give a rotatory motion to the heavy weight.

When the man 'strikes ile'—that is, brine and hydrogen gas—a terrific explosion usually takes place. The force of the gas is sufficient to annihilate any portion of the man who may be standing in its way; and for many weeks it is impossible to put anything down the well, until the gas has been partially exhausted. This is done by piercing small holes in the side of the well (which, for the first three hundred feet, is lined with cedar wood, and attaching thereto long pipes, through which the gas can be subdivided, conveyed any distance, and ignited for any required purpose. The force of the rising hydrogen thus expends itself upon these outlets, and it becomes possible in time to block up the well with a heavy stone. In the case of the one I closely examined, the hydrogen was carried along some distance by two main bamboo pipes, very solidly strengthened with a heavy clay skin: these two mains were then subdivided into twenty. These twenty had been fiercely burning, night and day, for many weeks, but the supply was so plentiful that no attempt at economy was

made, although each small jet could have more than sufficed for boiling several salt-pans in perpetuity. The annual rental on such a subdivided jet is about £100 a year: in one establishment which I visited seventy pans were kept going day and night, so that their owner would have to pay £700 a year, at least, to the proprietor of the hydrogen well. This explains how it pays to go on dabbling away, generation after generation: the longer a man works, the less wise it is to abandon what he has accomplished. He can borrow on the security of work done, and if he himself does not make a fortune, his grandson will; meanwhile, he himself mortgages future certainties. It is only the wells which have gas, but no brine, which are thus unmanageable and inexhaustible. Where there is brine as well as gas, the latter is kept within bounds by the former, and the proprietor uses as much of his own gas as he wants to boil his own brine, letting out the rest at a rent. There is a great deal of uncertainty about the gas of the brine-wells: sometimes, after issuing with the brine for years, it suddenly gives out; at others it as unexpectedly recommences, or even begins for the first time.

The gas from one of the subdivided jets has enough power to evaporate five hundredweight of salt in an iron pan three inches thick. Notwithstanding this force, the flame is at once extinguished if a small paving-stone is placed at the muzzle of the jet; the gas then escapes into the air through two smaller tubes, which are opened for that purpose, a few feet back from the muzzle; and if all the outlets are blocked, of course the gas forces its way through the one where there is least resistance. Nothing could be simpler or less expensive than these arrangements.

The wells must have been worked from the most ancient times, for I find the following sentence in the Chinese commentary to a work almost two thousand years old: 'As to these fire wells, if it be desired to extract their fire, the way is to throw some ordinary fire into them: in a moment there will be an explosion just like a clap of thunder, and a blaze of light visible for miles round. This fire can be conveyed away in bamboo tubing, in such wise as to make charcoal or coal unnecessary. Having thus got the fire from the well, you can boil the brine from the well, and you will get from forty to fifty per cent. of solid salt out of it: whereas, if ordinary fire were used, you would not get more than twenty or thirty per cent.' The viceroy of the province who was in power when I visited the wells, and who himself published a book on the reorganisation of the industry, places the date of their first profitable working towards the middle of the fourth century of our era.

A pair of enormous shears, well stayed and very firm, are fixed directly over the mouth of each well, and to the top of them is attached a strong pulley, round which passes the bamboo cord which supports the 'bucket.' The term bucket is only a makeshift expression for an immense tube, from twenty to fifty feet in length, fashioned of bamboo joints connected together with hempen cord tightly wound round

the screw-like thread cut into the outer face of the bamboo, and strengthened near each end by stout iron rings. The rope from the pulley passes under another wheel in a horizontal direction to the circumference of what may be described as a huge timber teetotum or decagonal framework, the axle of which is a perpendicular beam revolving in iron sockets below and above. Projecting spokes allow the attachment of four buffaloes, each of which a driver grasps by the tail with one hand, while with the other he belabours with a whip or rope-end. Through the nostrils of each buffalo is run a halter, so tied in front of him that he gets a cruel tweak each time he lags. The pace commences with a brisk walk, which gradually increases into a sharp trot, and even a gallop, the wretched animals panting for their lives, and lashing themselves into a tempest of perspiration. It took twelve minutes to haul up the particular bucket I stood watching. By measuring the number of times the rope encircled the teetotum, and then taking the diameters of this last, I found the depth of the well must have been as nearly as possible two thousand five hundred feet, or say, half a mile.

As with a nautical log-line, so with this rope; the last hundred feet or so at each end were marked with hide tongues, so as to give warning that the bucket was approaching, or the rope running out. Two of the four buffaloes are then slipped, and the pace is eased for the two remaining ones. The bucket contains about two hundredweight of brine, the emptying of which only occupies a few seconds: the brine is carted out into a tub or cistern let into the ground, from which a conduit carries the liquid through a rough filter into a roofed reservoir, kept under lock and key. The teetotum is then allowed to revolve backwards at a fearful pace, the weight of the long bucket giving the necessary impetus. As the top end of the rope draws nigh, a brake is applied by the foreman in charge. Like all the other native apparatus, this is extremely simple. It consists of flat bamboo strips, tapering into a twisted rope at each end, and one end is attached to the building, while the other runs half round the teetotum: the foreman simply sits on the flat part, when, of course, his weight checks the speed. The same four buffaloes are again immediately harnessed to, each team hauling up two buckets in succession, at intervals of about five hours. After their turn is over, the beasts are carefully groomed and stalled, and are, besides, regaled with a swim once in every twenty-four hours; their food is expensive, as all the country around has long since been denuded of vegetation.

Any one who has not a well of his own can buy brine from the reservoirs. As the country around is undulating, it is easy to convey the brine in any direction by the simple force of gravity, all that is necessary being that the starting point be a few inches or feet higher than the destination, and higher than any hillock over which the bamboo tubing may be conducted. The brine is, of course, not all of one quality; the blacker it is the better, and

the yellower it is the worse. The owners I spoke to did not place the yield of salt so proportionately high as the ancient authority I have quoted; the chief one said the best brine would only boil into twenty per cent. of solid salt. But it is only the fiercest furnaces that can produce the block salt at all; the jets of ordinary vigour will only produce granular salt, which is of lighter consistency. A cake of block salt weighs six hundred pounds, and this is deftly split into four quarters, each of which forms a man's load. One cake for each pan a day is exceptionally good work. I found that seventy pans produced, on the average, seven tons a day, taking granular and block salt together, at the particular establishment where I made close inquiry.

The boiling sheds reminded me very much of an English tannery, and also, to a certain extent, of the salt factories at Winsford and Northwich in Cheshire. The furnace over which each pan is placed is simply a hole in the ground, about six feet square and deep, and the gas tubes are conducted into this hole. The mouth of the gas tube is not more than half an inch in diameter. There are about six pans to each brine reservoir. These reservoirs are made of wood covered with clay, like tan-pits, and are automatically fed by conduits through which the brine trickles slowly into the pans. The wages are extremely high for China, about ten shillings a week, and food found; but good food (rice and pork) costs little in China, threepence a day being enough to feed any reasonable man. Each man works twenty-four hours at a stretch, and then rests for another whole day of twenty-four hours. He gets no holidays except at the New Year. The work is, of course, very trying, especially during the insufferable heats of summer; but the roof arrangements are good, and there is plenty of ventilation. The smell from the fresh brine and unburnt gas is decidedly bad, but the fumes from the furnaces did not appear to me to be at all offensive. The discrepancy between the ancient account and the modern, as to the proportion of salt that may be extracted, possibly arises from the fact that the 'curds and whey' of beans are in modern times poured into the boiling brine, in order to facilitate crystallisation; the result of this I was told was, that half the total solid product was 'sweet salt,' and half 'gall-cake.' This 'gall-cake' is too acrid for eating purposes, and is used to make paint and plaster bind firmly, and also to separate the curd from the whey of bean juice.

The salt costs about a halfpenny a pound at the factories, but government duties and the cost of carriage soon bring it up to threepence or even sixpence a pound. In fact, I found that I could roughly calculate the distance I was from any given spot in this province by inquiring the local price of salt. It is not easy to ascertain the exact production for each year, but it is certain that the government derives, from the Tsz-liu Tsing industry alone, an annual revenue of at least £500,000, even at the present low silver rate. It is everybody's interest to conceal the truth, and everybody concerned speculates wherever there is opportunity. I

spent a considerable time in trying to work out the approximate truth, and came to the conclusion that 600,000 tons a year would not be too high an estimate of the gross production of all the wells, including in this the Fu-shun and all other districts within a circuit of one hundred miles. Quite 30,000,000 people use this salt; so that, at this rate, there would be two tons for every thousand people, or from four to five pounds a head per annum.

THE FASCINATION OF THE KING.

CHAPTER IV.—WE REACH THE MÉDANGS.

OF our voyage from Venice to the Médang River I find, on looking through my diary, that there is little or nothing of importance to tell. We reached Colombo, where we had arranged to call for coal, two days in advance of the French mail-boat, and nearly a week ahead of the P. and O. steamer by which the king would, in all probability, have otherwise been compelled to travel. The stamp of the engines resounded night and day, and every noon the record of our progress was hailed with eager acclamation. It was extraordinary how every one on board the boat, from the person most interested, down to the very ship's boys, seemed to be impressed with the necessity of speed. I think of all the gifts vouchsafed to man, the most enviable is the power of affecting others with a participation in one's own desires, such as the King of the Médangs undoubtedly possessed. Sometimes, when I lay awake in the still watches of the night, I found myself almost wondering at my position. What was there in this man, I asked myself, to compel me to such haste, to make me spend my money so recklessly, to induce me, who detested haste so cordially, forego my own carefully planned arrangements, and find no satisfaction so great as the frothing of the water under our bows, and the high figures recorded on our patent log? And yet when I was in his company, it never occurred to me for an instant to wonder. I paced the deck by his side, cast anxious glances at the weather, prayed that no storm might arise to hinder us, and continually interrogated the captain and engineers as to the progress of the boat.

Under the influence of his excitement, our passenger's despondency about his own health seemed entirely to have left him. Never once did he refer to his doctor's report in any shape or form. He was occupied from morning till night, plotting and planning, and preparing himself for every possible contingency that might await him on arrival in his dominions. Sometimes he made me his confidant, at others he would keep himself strictly to himself. At all times, however, he was consideration and courtesy itself. A guest more charming, or one more easily pleased, it would have been scarcely possible to find.

When Ceylon was once behind us, and we were steaming across the Indian Ocean, bound for Singapore as fast as our engines would take us, every one's restlessness seemed to increase by leaps and bounds. In less than a fortnight we

should reach our destination, and our friend would know the worst.

On the afternoon of the day that we entered the Straits of Malacca, I was seated near the saloon-companion reading, when the captain descended the ladder from the bridge, and came to speak with me.

'I am sorry to have to tell you, my lord,' he said abruptly, as he touched his cap, 'that the engineer thinks he is running short of coal.'

There was always a standing feud between the bridge and the engine-room, and Wells was only too glad to have a chance of presenting his enemies to me in an unfavourable light. I therefore resolved to make inquiries before I committed myself to any line of action.

'How much has he still in the bunkers?' I inquired.

'Plenty,' he says, 'to take us into the Gulf of Siam,' was the answer, 'but not sufficient to see us across it.'

'You infer by that, I suppose, that we shall have to call at Singapore,' I continued. 'That will mean a long delay and, as you know, under the present circumstances, every hour is of importance.'

'I am quite aware of that, my lord,' he replied, with an aggrieved face. 'I told Mr McGill so myself only ten minutes since.'

'Send Mr McGill to me, if you please,' I said. 'This is a very serious matter, and we must not decide hastily.'

A moment or two later the skipper returned with the engineer, a weather-beaten old Scotchman who had been in the service of my family ever since he had been able to earn his daily bread. I questioned him on the subject of the coal, only to learn that it was necessary beyond doubt that we must call at Singapore, otherwise we should be unable to reach our destination. There was nothing for it but to make the best of a bad bargain. I accordingly gave the required instructions, and rose from my chair to go and inform the person chiefly concerned. Just, however, as I was about to enter the saloon-companion, I espied him coming up the stairs from below. When he reached the deck I turned and walked with him to the rails. He looked eagerly at me.

'You have some bad news for me, Lord Instow,' he said, with that peculiar abruptness characteristic of him. 'I can see it in your face. What has happened?'

'Something that will cause you some annoyance I fear,' I answered. 'The chief engineer has just been to me to say that he has not sufficient coal in his bunkers to carry us to our destination. Steaming at the pace we have done has caused the store we took in at Colombo to vanish in half its ordinary time, and we must therefore put into Singapore for a fresh supply.'

The king's face clouded ominously.

'Another delay,' he muttered, 'another delay. And every hour of vital importance.'

He walked a few paces from me and I saw his fists clench, and his mouth harden. Suddenly he wheeled round, and came back to my side.

'I am proving myself sadly ungrateful,' he said, 'after all your kindness to me. I hope

you will forgive me. For a moment, I must confess, I was disappointed, for I am so eager to get to my kingdom that I can bear no delays. But I know that you are as sorry as I am. How long do you think it will take us to get in a fresh supply?'

'At most not more than five hours,' I answered. 'I cannot tell you how vexed I am that such a thing should have occurred. But I fear it could not be helped.'

'Say no more about it, I beg of you,' he answered. 'In any case, we shall be there some days before I could possibly have reached it in the ordinary course of events.'

'And then you will know everything. And your mind will be set at rest.'

'Yes, I shall know everything,' he replied, with an infinite sadness in his voice. 'How much that means, "know everything!" But there is one question I have been wishing to ask you every day. When you have deposited me at my destination, what do you and your sister intend doing?'

'We had thought of calling at Haiphong, and then proceeding on our way to Japan,' I answered.

'Are you in any great hurry to reach the Land of the Chrysanthemum?'

'No,' I replied. 'We are idle folk, and there is no particular need of haste.'

'Then why not stay with me for a week or two? I should like nothing better than to have an opportunity of repaying all the kindnesses I have received at your hands. There is much to be seen, believe me, and to one who, like yourself, takes such a vivid interest in the building up of new countries, there are endless traits to be studied in the people themselves. Come, Lord Instow, what do you say? Will you remain with me for a while?'

He looked at me with his dark lustrous eyes, as if more than I could guess depended upon my answer.

'I should enjoy it immensely,' I replied. 'But I must first consult my sister. If she has no reason for hastening on to Japan, I shall be only too glad to accept your hospitable invitation.'

'We must place the matter before Lady Olivia, then, and see what she says.'

Accordingly that evening at dinner our guest introduced the subject, and when Olivia had given her consent, it was definitely settled that we should accept the invitation extended to us. For my own part, I must confess, I was glad. I will own to a vulgar curiosity. I wanted to examine his country carefully, to criticise his rule, and I was also anxious to learn what untoward event had called him so suddenly from Europe. Such a favourable opportunity might never occur again, and under these circumstances I was resolved to make the most of it.

Two days later we reached Singapore, spent a miserable day coaling in the harbour, and continued our voyage the same evening. Once in the Gulf of Siam, we were nearly at our journey's end. In three days or thereabouts we should be in the Mélang River, which the king had informed us was navigable up to his capital; and then for a spell ashore!

As the distance that separated us from the

land decreased, the king's anxiety became almost painful to watch. Throughout the day he paced the deck, casting anxious glances ahead and astern, as if by so doing he could hasten the progress of the boat.

On the evening prior to our making the land, while I was engaged upon the bridge, he discovered Olivia standing at the taffrail, watching the water creaming in the wake. The night was warm, and the sea was strangely phosphorescent.

'In forty-eight hours or thereabouts you will be in your own country once more,' said my sister, when they had been standing side by side for some few minutes.

'Yes, I shall be at the head of my kingdom again,' he answered, in a low voice; 'and from what I imagine, it will be about time. It is a good thing, Lady Olivia, that few people are compelled by fate to know the suspense that has been my portion these five weeks past. And it also falls to the lot of but few to have such good friends as yourself and your brother. How I shall ever be able to thank you both sufficiently for all your goodness to me I do not know.'

'I'm sure we have equal cause to be grateful to your highness.'

To this he offered no reply, but glanced round the horizon, and then up to the multitudinous stars shining in the firmament of heaven.

'Shakespeare tells us "There is a tide in the affairs of men which, taken at the flood, leads on to fortune,"' he continued; 'but he says nothing of how we are to guard it when advantage has been taken of the flood, and the fortune has been acquired. My kingdom is my fortune. I have won it; am I to keep it or not? That is the question that the next few weeks have to answer.'

'Keep it?' cried Olivia with conviction. 'As I said to you in Venice, you *must* keep it, come what may.'

'You wish me success, do you not?'

'With all my heart I do,' she answered; 'you must not even *think* of failure. It could never be.'

'You have said you wish me success with *all* your heart, Lady Olivia,' he said, with peculiar emphasis; 'have you any notion of what construction those apparently simple words may have put upon them by a lonely man?'

She gave a little start, and her hand suddenly clenched upon the rail before her; she did not answer, however.

'You must remember,' he said very slowly, and with increasing earnestness, 'that after all, sovereigns are men first and kings afterwards. To win your esteem I would accomplish anything possible to mortal man; nothing could be too difficult for me. But I am frightening you. I had no right to do so. Forgive me; I will say no more now, but will content myself with one question. Having said so much, can you still bid me go on and prosper with *all* your heart?'

She looked up into his face, and then in a voice so soft that he could scarcely hear it, whispered:

'I do. Go on and prosper.'

He bent his head over the hand he held, and pressed his lips upon it. She did not try to

prevent him; but, as soon as he released her, she turned on her heel and sped away along the deck towards the saloon companion-ladder. When she came to bid me good-night half-an-hour later, her eyes were red as if with weeping.

'Why, Olivia,' I said, holding her beautiful face up to the light that I might examine it, 'what does this mean? You have been crying. Come, come, darling, what has made you unhappy?'

'I cannot tell,' she answered, her face now buried on my shoulder. 'I do not know.'

Seeing that she was in a state when it is not wise for a man to make any attempt at comfort, I changed my tactics, bade her not be silly, and having done so, led her to her cabin. Afterwards I went on deck, more puzzled as to the reason of her tears than I cared to own.

I found the king pacing up and down before the smoking-room. To my surprise, I found he was in happier and more confident spirits than I had seen him since we left Venice.

'We are making the best of headway,' he cried, as I came up with him. 'I should say we're doing a full sixteen.'

'I can tell you exactly,' I answered, going to the ladder that led to the bridge, and calling the mate to me. From him I inquired our speed, and was surprised to hear him reply 'sixteen and a half.'

'That being so,' said the king, 'we should have the coast in sight at daylight, and twenty-four hours later should see us at our destination. After that I can get to work. I feel as if we are on the threshold of great events.'

'You seem somewhat more confident this evening.'

He looked at me very closely for a second or two, and then, gathering from my face that I knew nothing of his interview with Olivia, continued:

'I am more confident. As I approach my country my old spirit is coming back to me. I am determined that my arrival shall mark a new epoch. What I have done in the past shall be as nothing to what I will do in the future. I will let you see of what great deeds I and my people are capable, and then you will be able to judge for yourself what our future is destined to be. Lord Instow, who can say that I am not building up the nucleus of what may some day be the ruling power of the East? You think of India, of Russia, of China, of Japan, and you smile incredulously. You deem it impossible, but I am not abashed; to-night I am prophetic and can see clearly into the future. I see my people increased to more than double their present number; I see the soil of my country utilised to the best advantage; I see my cities filled with honest traders, my borders extended to the China Sea on one side and the Bay of Bengal on the other; I see ships carrying the produce of my land to the other great nations of the world, and the vessels of those countries at anchor in my harbours. Trains traverse my plains, all the latest aids to civilisation are known and utilised by my people, I live at peace with my neighbours, and having done my life's work I see my son ready to take my place when I shall step down from the throne.'

'God grant it may be as your highness pre-

dicts,' I answered, quite carried away by the eloquence with which he spoke.

'God grant it may,' he answered, lifting his hat from his head as he spoke.

Then taking my arm, we began to pace the deck together, building up and perfecting the empire which he had so sanguinely anticipated. It was a lovely night, and as the king was not tired, we continued to walk and talk long after the bell had struck midnight; then, as the dew was falling heavily, we adjourned to the smoking-room, and continued our discussion there. When we had finished, I discovered, to my astonishment, that it was on the stroke of three. In an hour and a half at most it would be daylight, and soon after that the coast should be in sight. Under these circumstances, we determined to remain upon deck to welcome it.

An hour later it was light enough to enable us to see the yacht from stem to stern. We accordingly left the smoking-room and ascended to the bridge. Here the air struck strangely cold, and a slight mist hung upon the water. I inquired our speed from the skipper, who had just joined us, and he answered, 'Barely ten.'

In less than an hour the sun rose on our starboard bow, and when he was well above the sea a faint line revealed to us the land ahead. From contemplating it I turned to the king. His eyes were fixed upon it, and his mouth was firm set as if he were clenching his teeth that he might prevent himself from betraying his emotion. Proportionately as the land rose above the waves his excitement increased, until, when it was close enough for us to be able to discern its general outline, he could contain himself no longer, but putting out his hand, squeezed mine in it, and muttering something I could not catch, vanished below. A quarter of an hour later I followed his example, and turned into my bunk to sleep like a top till breakfast-time.

When we visited the deck again, we were close in-shore, approaching, under easy steam, the entrance to a large river whose broad mouth emptied itself into the sea between two lines of thickly wooded cliffs. Evidently this was the Médang River of which his highness had so often spoken to us. Olivia was by my side, pale and heavy-eyed, as if she had not slept a wink all night, which I afterwards discovered had been the case. The king joined us a few moments later, and, standing at my elbow, watched the scene with straining eyes. And indeed the picture presented to us then was one that might have appealed to the most blasé of travellers. You must picture for yourself a cloud-capped mountain range, the foremost peaks of which rose almost precipitously from a green jungle that stretched well-nigh to the water's edge. Indeed, though I looked for it, beach I could see none. Straight before us, without bar or other hindrance, lay the dark sluggish waters of the Médang River, out of which the palm-clad hills rose abruptly to a height on the right of six hundred feet, on the left to possibly a thousand. With the strip of green sea before us, and the lights and shadows thrown by the clouds upon the hills ashore, we were presented with such a view as I

doubt any one who saw it that day will ever forget.

It was evident that the captain had made himself thoroughly conversant with the locality, for he steamed boldly in, keeping as far as possible in the centre of the stream, in order to avoid snags and dangers of a similar nature. Clustered on a plateau at the foot of the eastern hill were a few small huts, otherwise the landscape was devoid of human dwellings. Indeed, the king informed us that with the exception of a small town situated fifty miles or so inland, there was no settlement of any importance between the sea and the capital.

(To be continued.)

THE SMALLEST PRINCIPALITY IN EUROPE.

VERY few of the tourists who travel along the Arlberg railway every autumn on their way from Switzerland to the Tyrol are so much as aware of the existence of the tiny principality of Liechtenstein, through which they rapidly pass in the express train. Between the Swiss frontier-station at Buchs and the Austrian town of Feldkirch the line traverses for five miles one of those small, independent states, which by some miracle have survived down to our own day in the midst of their powerful neighbours, and show us, in the last decade of the nineteenth century, what the miniature principalities of the middle ages must have been like. Every one has heard of Monaco, the little Italian republic of San Marino is dear to collectors of postage-stamps, and the Spanish commonwealth of Andorra is occasionally mentioned in the newspapers; but of Liechtenstein, the fourth and last of these curious mediæval survivals, the British excursionist knows hardly anything. Yet it well repays a visit from the traveller who has a spare week on his hands. If he be a sportsman, he can make friends with the Prince's forester and perhaps have a shot at the chamois which haunt the mountains at the back of the principality. To the botanist, the fields and hillsides are full of attractions; the philologist will find ample scope for his science in tracing out the many relics of the Romance language which abound in the villages. Vaduz, the little capital, is a beautifully situated place of about eleven hundred inhabitants, planted amidst its luxuriant vineyards, beneath the frowning crag upon which the old castle of Liechtenstein stands to keep guard over the valley of the Rhine below. Although it is so small, Vaduz can boast of a delightful old inn, where the beds and the cooking are all that can be desired, where the black-coated waiter has not yet made his appearance, and the genial landlord and his wife do everything they can to make their guests comfortable.

The little principality is a perfect miniature of one of those great states with which we are all so familiar. Liechtenstein has its Prince, its Constitution, and its Parliament. The Prince, John II., who succeeded to the dignity in 1858,

is not very much in the principality, but resides for the most part either in Vienna or on his other Austrian estates, which are very large. But he usually comes in the autumn for the shooting, and the new hunting-box which he has built near the old castle will probably bring him more frequently to Vaduz. Among his people he is very popular; *er ist ein sehr netter Mann*, said an old villager, pointing to the Prince's portrait which hung over the mantelpiece, and added that it was a pity he did not enjoy better health. Fifty-six years of age and unmarried. By disposition the Prince is rather shy, but he is a keen sportsman, and, like most of his people, a very devout Catholic, as the new Gothic churches which he has built at Vaduz and Schaan fully prove. It was even rumoured at one time that the pope himself, if he quitted Rome, might find in Liechtenstein a second Avignon. There is a story too that the proprietors of Monte Carlo once meditated removing their famous tables to the little Alpine principality, but that the Prince promptly refused to permit it. The Liechtensteins are such a simple-minded, honest folk, that it would be a great pity if anything of the kind occurred, and it is certain that the reigning Prince will never sanction such a step.

By the Constitution of 1862, Liechtenstein possesses a local diet, composed of fifteen members, three of whom are nominated by the Prince, and the remaining twelve are elected by manhood suffrage, every male citizen of full age who lives in the country having a vote. This miniature House of Commons meets once a year, and is elected every four years. The executive consists of a regent or *Landesverweser*, who acts for the Prince in his absence, and under him are the communal body and forester's department. There is a court of law in Vaduz, with an appeal in the first instance to Vienna, and in the second to the Austrian superior court at Innsbruck. It has been found convenient to allow the Austrian Government to manage the post, so that Liechtenstein—to the regret of philatelists—has no stamp of its own, using instead the ordinary Austrian stamps and coins. By a recent convention, the principality is combined for custom-house purposes with the Austrian province of Vorarlberg, but in all other respects it is perfectly independent. Its inhabitants devoutly wish that it may remain so, and not without reason. For Liechtenstein enjoys the almost unique distinction among continental nations of having no army and no compulsory military service. Before the Austro-Prussian war of 1866, Liechtenstein formed part of the Germanic Confederation, and was bound to furnish its quota of troops to the Federal army. Always Austrian in sympathy, it voted for mobilisation against Prussia, and sided with Austria in the struggle which ended at Sadowa. But, after the war, its little army of eighty men was disbanded, and has not been revived. Naturally, those who wish to avoid the conscription in other neighbouring countries migrate to Liechtenstein, and it is to this fact that the considerable increase of its population—now about 10,000—and the preponderance of males over females are due.

It is jokingly said that in the rearrangement of Germany in 1866 and 1871 Liechtenstein was left out because Bismarck forgot the very fact of its existence. But its people, according to their own account, have every reason to congratulate themselves upon their exclusion from either of their heavily-taxed neighbour-lands. Obscurity has its advantages. The only serious fiscal burden under which they suffer is the tax imposed for the maintenance of the dam which is necessary for keeping the Rhine within its bed. Every winter the stream, which forms the western boundary of this little state, overflows its banks below Vaduz, and floods the low-lying meadows which separate the river from the mountain-range of Liechtenstein. Great damage is done to the farms in that neighbourhood, and the cost of keeping the river-banks in proper order falls very heavily on the little community.

The greater part of the Prince's territory consists of mountain. At the northern extremity, where the railway runs through it, the country is fairly level, and broadens out into a plain, which is, however, broken by the low ridge of the Schellenberg, once an independent principality, belonging to counts of its own. But from Vaduz to the extreme south boundary there is very little space available between the mountains and the river. Here and there are hamlets dotted over the mountain side, or nestling among the vineyards in the valley. There is Triesen, once, it is said, a famous Roman settlement, overwhelmed by an earthquake in some bygone age. There is the picturesque village of Balzers too, with the fine old ruined castle of Guttenberg above it, of which strange legends are told. A lovely walk up the mountains through a tunnel, known as the Triesenberger Kulm, leads into the wild and romantic Samina valley, the home of the eagle and the chamois. Another and easier excursion is over the pass of St Luziensteig, which is commanded by the now disused Swiss fortress of that name, into the canton of the Grisons, and down to Ragatz and Mayenfeld. But the most interesting walk is up to the old castle of Liechtenstein itself, with its fine ivy-covered walls, part of them dating from Roman times, and round through the woods to the dismantled Wildschloss, once a robber-stronghold, from which the watchman could spy the boats, laden with rich merchandise, as they sailed down the Rhine. High mountains, it must be confessed, there are none—at least, in the sense in which the Alpine Club use the word. The 'Three Sisters' above Vaduz are barely 8000 feet high, the Naafkopf, the highest mountain in the principality, only 8560. But of fine mountain air and varied mountain excursions there is plenty, and almost every hill and valley has a legend of its own. Liechtenstein, like Vorarlberg, is very rich in folklore, and the learned Dr Vonbun, who knew the locality well, has made a most interesting collection of local legends.

The people themselves are the descendants of a Germanic race which gradually swallowed up the Rhaetian colonists who formerly inhabited the land. Originally a Roman settlement, Liechtenstein still preserves many traces of the

Romance language, which was still spoken there as late as the seventeenth century. Vaduz, the name of its capital, is a corruption of the Latin *vallis dulcis*, or 'pleasant valley;' and such names as Gamprin, Schalun, Valorsch, Samina, Gavadura, Valina, Mazoura, which all occur in the principality, are, as Dr Umlauf of Vienna has pointed out, all of Romance origin. Quite recently there has been a large importation of Swiss labourers to work the cotton mills at Schaan, but the people are still happily uncosmopolitan, and are quite content to live as their forefathers did before them, 'the world forgetting, by the world forgot.' A couple of years ago they actually attained to the dignity of a parliamentary crisis and a paragraph in the European press. But that was a rare exception.

THE GREEN-CUB MINE.

A WEST AUSTRALIAN STORY.

By ROBERT BAIN, M.A., Author of *A Buccaneering Raid*, &c.

I.

I HAD just returned from my bun and milk lunch, and was sitting down to copy a deed, when I received a telegram.

'Hallo, Tommy,' said Brown, 'who on earth's sending you a telegram?' For the clerks in our particular department of Law & Livingstone's, 171 St Regent Street, Glasgow, always gave special instructions to their aristocratic friends not to send telegrams to the office, or the governors would be for reducing their salaries. So at least they said, but as the average amount of the salaries in question was something like eighty-five pounds a year, the statement is open to doubt.

I opened it, and a smile of delight flitted across my face as I read: 'Central Hotel—come—immediately—important—just—arrived.—Jemima.'

I can hardly hope to describe the effect produced upon me by that signature; for Jemima was my old chum Billy Johnstone, whose indomitable pluck and reckless boyishness had not sufficed to remove the nickname which his gentle voice and girlish face had won him. But what gave me the actual pleasure was that I had not seen him for over two years, but had only heard from him at long intervals from Albany and Coolgardie. I had not even called on his folk at Cathcart, other interests of a pleasanter, if more heart-disturbing nature, keeping me generally in the western districts of the city.

As I did not know how long I might be out, I showed the telegram to old Livingstone, and readily got permission to go. I rushed down to the Central, wondering what the important business could be, and five minutes later was shaking hands with the best fellow I've ever known—the only one I have ever met who was at once scholar—in a moderate sense—and player, man and boy.

But what a change these two years had

wrought in him! Three inches had been added to his height, and the feminine note in his face had changed, and left only a pleasant memory of it in his eyes, blue and soft as of old, yet with the same old laugh lying in ambush behind them. The other interests already alluded to tended to make me sentimental, but he quickly cut short my apostrophes with a new, strange, business alertness which I was quite unable to account for.

'Here, I didn't send that telegram just for fun, Tommy. I've got the finest investment in the world for you, and there's just a possibility that in a couple of hours your chance will be past. Have you any money?'

'About ten or twelve pounds,' I said, after a moment's reflection to consider if there was not another odd pound to be scraped up somewhere.

He laughed. 'That blessed law! Why didn't you go in for the kirk, Tommy, or buy a public-house on borrowed money? But the law! Oh, I could write melancholy epics about the law!' He had been in a law-office for eight months himself. 'Ten pounds! And what can you borrow?'

I hesitated, for I am Scotch.

'Is it safe?' I asked.

'Safe! D'ye think, you ruffian, I'm a Jabez Balfour? I tell you that except what's necessary to keep me for another month, I haven't a farthing that isn't in it, and every one of these farthings will be ten within three months!'

I became excited, as a prospect of fabulous wealth opened up before me. 'I can get fifty pounds from old Service, I think; and I believe I could get about other thirty.'

'Ninety pounds. 'Tisn't so bad. Then gallop and get it, and be back here within forty minutes. Every minute's pure gold.'

'But it's impossible!'

'You must. It means nine hundred pounds, Tommy, and I've heard about some one called Peggy. Get a cab, and run the horse off its feet. It's ten to one just now. You'll be here by one-thirty,' and he thrust me out of the door.

I hailed a passing cab. We were more than once like to be stopped for furious driving, but I scarcely noticed, for I was in a world of impossible dreams. Old Service wasn't in his warehouse, and I had to hunt him up at his club. He saw the excitement in my face, and it was impossible to screw the money out of him without telling him all I knew.

'Who is your friend?' he asked suspiciously. I told him.

'He's to be trusted!'

'Like gold.'

'H'm!' He pondered. I was in fidgets.

'I'll tell you what. If you're open to take the risk, I'll give you a cheque for three hundred—half to go in my name. Eh?'

I almost fainted, but recovered—took the cheque, almost leaped over the stairs in my excitement, but managed to find the cab-door without misadventure. The cab seemed to crawl as we drove round to the others I wished to visit, but at one-twenty-five, I rushed into the hotel in frantic excitement, and met 'Jemima' in the entrance hall.

'How much have you got?'

'One hundred and sixty for myself, and a hundred and fifty for Service!'

'By George, you've done well. Come on then, into the cab again!'

We entered. 'Stock Exchange,' he called to the driver. We were there in a couple of minutes. He sprang out and hailed a passing broker:

'How are "Green Cubs" standing?'

'Four-and-six, I believe. I'm not certain, however. There's not many dealings in them.'

'Buy three hundred and ten pounds' worth, and send the note to—have you a card, Tom?'

I gave him our office card.

'To Thomas Buchanan, care of Law & Livingstone's, St Regent Street.'

'All right, sir,' and he left us.

'Jemima' turned and shook my hand.

'That's the best day's work you ever did, Tommy, my boy. One-sixty divided by five shillings—six hundred and forty shares, and by this time to-morrow they'll be worth a pound a piece. In a month you'll get any money for them.'

'Good gracious!' I exclaimed, startled beyond all measure, 'how do you know?'

He took out a cablegram, evidently from Australia, and showed me that it contained the one word, 'Grip.'

'Do you know what that means?' he cried triumphantly. 'Ten ounces to the ton, and the best mine in West Australia!'

'But how do you know anything about it,' I asked.

'Me! I'd like to know who should know better. I'm the "Green Cub"!'

II.

It would be useless for me to give a column of the interjectional remarks uttered by me on hearing this astounding statement. The more so, as 'Jemima' would not volunteer a single word of information till we had driven back to the hotel, where, having ordered coffee, he gave me, while we drank, a full and true account of what bids fair to be the most famous Australian mine.

'You remember my last letter from Coolgardie?'

I nodded. For from previous letters I had learned all his progress in Australia, from the day he landed in Albany to that of his arrival in the mining capital of the west. I knew all his adventures, too—how he had helped to load a ship with coal at a pound a day, immediately on his landing—of his first night out on the Australian plains, and of his long tramp north to his first mine—all of which might be spun out to many most interesting pages—of the life at the diggings, where he arrived on a Sunday to find an international athletic meeting in full swing; and of all the wonder that comes flooding on the 'new chum,' and flings into prosaic relief the old life across the seas. Yes, I remembered, for had not the first romance almost whirled me from my feet and whirled me too off in quest of phantom fortune at the gold mines?

'Well, I told you what a go-ahead place Coolgardie was; every man dead-nuts on making

money, and never a moment of rest; chokeful of brains, work, and money, and a mighty tight corner for the man who is not particularly blessed with any of the three. I soon saw there wasn't much chance for me there, for let me tell you, Tommy, what the engineers in Coolgardie just now don't know about mining isn't worth knowing.

'So I tramped out north, and got a berth at the Scandinavian Reefs, about a hundred and fifty miles to the north-west. I was there exactly three months, and had managed by that time to save thirty pounds—of course you know the regular wage was three-ten a week and water; and as I could live comfortably on a pound a week, I simply saved hand over hand. We usually stopped work at four when on the day-shift, and one day on coming back to my tent, I found things in considerable disorder and my money gone.

'I at once raised an alarm, and the rest of the miners, who had tents near by, all came rushing up. At that very moment my neighbour, a wages' man like myself, came running out of his tent with the cry that he had been robbed. We all ran to his tent, and found that there too, as in mine, everything was in confusion; but after further examination, his money was found all right. The affair was rather a serious one; for there were only twenty-three in camp at our mine, and one of these, it seemed, must be the thief.

'Under the circumstances all volunteered to let their tents be examined, and a committee of three having been appointed, a search was made, but nothing was found. When all was over, they came back to my tent and made a minute examination of the ground, and as one of the three had been a tracker in the Sydney police, they were not unfitted for the business. The traces had been carefully removed by trailing the sand over them, but in one corner was found a solitary heel-mark, and a peculiar one at that. For on the inner side it had been roughly cobbled, and the coarse patch had left a clearly-defined impression. Now, rightly or wrongly, suspicion had fallen upon my neighbour—Macnaughton was his name—and, in his absence, his tent was searched that very evening, and a pair of spare working-boots found whose right heel corresponded exactly with the heel-mark in the tent. Still, this was too slight a clue to build a case upon. Next day, however, two of the miners who had left the camp a little before sunrise to try a little prospecting on their own account, on their return brought back the somewhat significant news that they had seen Macnaughton walking along the edge of a lake, a mile distant, shortly after dawn. Certain movements of his were deemed by them so suspicious that they thought fit to report the circumstance to the committee. The latter regarded the information as so important that two of them, including the tracker, slipped down to the lake. Of course the rest of the camp was now at work, and no one was aware that anything was on. On reaching the side of the lake at the spot indicated, they found a clear trail running along the shore of silt and sand for half a mile, and stopping at a large boulder which lay at the lake's edge.

'I should mention that the lake, like most of those in West Australia, was a salt one, and covered with a sheet of salt just like ice; but at several places this had been broken close to the shore, and the boulder lay half in and half out of the water at one of these spots. There were no marks on the shore side, so one of the two waded into the water, and dipping his arm, felt along the foot of the rock. At one point his hand came in contact with a large stone which seemed to block up a gap in the base of the boulder, and he had to use both hands to lift it away. Thrusting his hand into the opening, he immediately touched a canvas bag. He drew it out, and on opening it found that it contained my thirty pounds, neither more nor less. This was brought to me without any stir being made, and so the first great mistake was made. For, whether they, being members of such a small camp, disliked doing anything without certainty, or whether they simply desired to take the man red-handed, I cannot say; at any rate they did not make any attempt to arrest him, and that same afternoon Macnaughton expressed his intention of leaving for the Barrier Reef fifty miles to the south.'

'But where was the mistake?' I interrupted.

'Oh, that will come out in the sequel. But they should not have removed the money if they wanted to catch him in the act. Of course it was at once seen that he was about to play into our hands by visiting the boulder where he had left the money, and next morning when he packed up, and shouldered his traps for the southward tramp, one of the committee said that he was going that same day to a neighbouring reef, about six miles distant, and would take the chance of his company along the road. Of course there was no excuse for refusing such an offer, and the two went off, while those in camp awaited with considerable eagerness the turn of events. As for me, my practical share in the affair being over, I determined to get my money banked as soon as possible; so, borrowing a horse, I proceeded to ride to Clearhills, the nearest banking station. Meanwhile, the two men had left the camp and tramped off to the south. After walking some four miles, however, Macnaughton complained of an old sprain, and told his companion he would wait for an hour or so, and rub it with some whisky. The other needn't wait however.

'The other didn't wait, but walked for about a quarter of a mile, then doubled back under cover of some scrub that lay to the east, and lay watching his man. The latter waited for about ten minutes, then rose, looked searchingly along the southward road, and finally moved back towards the camp at a swift pace. The watcher cut across the scrub, and reached the end of the lake and lay down. Soon afterwards, he saw Macnaughton come out of the bush between the lake and the road, and walk along the high bank until he reached the boulder.

'Even then he seemed suspicious, and it was only after a careful scrutiny of the lakeside that he ventured into the lake. He stooped and drew the stone aside, and then, to give the

very words of the man who was looking, "he staggered against the rock, and I'm blest if I didn't think he was going to drop."

'I believe that at that moment he must have fancied the eyes of the whole camp upon him. He stood for a moment leaning his head against the stone, then, with the manner of a hunted animal, crept into the bush and disappeared. The watcher at once ran round to the road, but as he was lying about the middle of the southern shore, the other, though only the third of a mile off across the lake, was about a mile and a half ahead by the road. The result was, that though half the camp turned out to search the scrub, they failed to find their man, though he was thought to be still lying in the neighbourhood. Mistake number two; and now the "Green Cub" comes into the yarn.

'To understand what follows, you must know the lie of the roads. From the Scandinavian Reefs you travel five miles along the Coolgardie road to the Blue Boulder Mines due west; then a seven miles' ride slightly north-east brings you to Clearhills. But from our camp to this road is barely two miles across a country of rock and high scrub. Picture me then riding confidently along this road two hours later garbed à l'Australienne—if that be the proper French for it. I felt rather proud, I can tell you. Only eighteen months from home, and here was I, rigged out like the best of them and just as formidable-looking, cantering across a West Australian plain. You see I was an old enough hand to have caught the style, and new enough to have retained the sense of novelty.

'I was just thinking how I would startle the natives if I were to ride out Crosshill way in the same guise, and what a dash I would cut as I galloped through Mount Florida, when I saw some one hurrying forward half a mile ahead. I innocently yearned for company, and gave my horse a dig, that sent it forward at a gallop.

'When I was still about a couple of hundred yards behind, the person turned and stood staring at me for a little as I rode up. I could perceive that, whoever he was, he had had a heavy tramp, for his clothes were almost in shreds as if with forcing his way through the bush. At the point where he was standing grew a gray wilderness of almost leafless trees, as impassable as the scrub itself, and into this he dived as I approached. Coming up to the spot, I looked about me in wonderment.

'Now, had I not been a bit of a jay, I would have ridden on with the reflection that if a man in a wild country wishes his privacy respected, it is advisable to give him all he desires. But, being a jay, I dismounted and walked forward to the point at which the man had disappeared. I was still peering forward when a shot came from a point not many yards in front, the bullet whistling past the side of my head, and striking the rock which bordered the other side of the road with a sharp click that I fancy I can hear yet.

'I turned and ran for my horse, but another bullet caught me in the hip; and though I

contrived to stagger to the bridle I fell, as much through fear as pain I fancy. Through the mist of failing consciousness came the dim vision of a face seen somewhere else, and then all was dark.

"When I came to, the sun was well to the west, and his rays were reflected from the white road in a hot blinding glare which was unbearable; so, to get out of the direct heat, I crawled painfully across the road to the solitary ridge of rock on the northern side, which rose above the general level beyond like a whale's back. Irregular bush varied the monotony of the waste, and the outliers of the leafless wood made a thin disappearing fringe along the roadside.

"Once against the rock, and partially sheltered from the heat by a gray trunk, I began to consider the situation my stupidity had landed me in. It wasn't a pleasant one. My precious money was gone for a second time, and with it the borrowed horse; and here was I, lame and faint with loss of blood, half-way between two stations. I sank down disconsolately, and to tell the truth, I cried from pure anger against the cruelty of circumstances. Suddenly, I caught sight of one memento of Australia, the flattened bullet which grazed my head. I picked it up, and the next moment fairly gasped. Some small yellow particles were sticking to it. A few fragments of rock had fallen with the bullet. These I picked up with considerable trepidation. *They were literally sown with gold.*

"Despite the pain it caused me, I stood up again, and examined the place where the bullet had struck, and I believe I yelled. I didn't know much yet about mining, still I knew there wasn't a reef like it as far as Coolgardie. I'm not joking, Tommy—the gold was simply sticking in it like peas.

"My pain vanished like magic. I tore up a scarf I wore, bandaged the wound the best way I could, broke off the branch of a tree, and, using it as a stick, crawled into Clearhills, and registered the spot as my claim."

"But I thought you could establish a claim by merely pegging out," I exclaimed.

"As a matter of fact I lost my head, and was mortally afraid of pegging out myself, if I waited. But listen to the sequel. My horse, instead of being stolen by my assailant, as I imagined, had galloped back to Blue Boulders, with the result that a couple of miners rode out in search of me, while word was sent back to the camp and a pursuit organised.

"Three hours later these two came riding into Clearhills in a fever of excitement. They had come across the trail of blood from my wound and seen where I had crawled to. While examining the spot they had noticed the remaining particles of rock, re-discovered the reef, and pegged out as many claims as they thought they could hold. They galloped up to the registration office in order to make doubly sure.

"Already registered," said the agent.

"Great Scott! Who by?"

"William Johnstone of Scandinavian Reefs."

"Put down our names for the nearest claims, and we'll see how the business dillies out."

"Then they went to find me. I was lying in the hotel in a wild confusion of weakness and intoxicating dream. They stood gazing at me in wonder while I told them all that had happened.

"And you crawled in here?" said one. I nodded.

"Well, I've been at the game for ten years, and have mined from Queensland to Coolgardie, and have never struck it rich yet till now; and here you go cavorting around like the little green cub you are, and play at being popped at with guns, and hang me, if the blamed bullets don't go prospecting for you. A blooming little green cub as we used to call them at Bendigo."

"Then he turned with a grin to his companion.

"Hang it, Jim, if we don't name it the 'Green-cub Mine' as an insult. Lor', I wish some chance would come along and insult me. Never mind, young one, we don't grudge you your streak of luck, for if you are a cub, you're a blamed plucky one," and he gripped my hand in a fiercely-gentle way that made me squirm.

"I needn't bother giving you all the details of how I clubbed with them and other two pals of theirs, and so held the reef till we sold it to a syndicate for six thousand pounds and a thousand shares apiece; but you may guess how confident I am when I tell you that I've practically sunk every penny of it in the company."

"And what about Macnaughton?" I asked.

"I don't know where he disappeared to. As a matter of fact, I forgot all about him in the excitement of my find, and when I did think about him, I felt rather obliged to him than otherwise. On the whole, I think we were easily quits. And now, are you for a game at billiards?"

"You forget I've the office to go back to," I replied.

"But I couldn't have played in any case. The gold fever was upon me, and I was trembling with excitement. I rushed back to the office, and went to work at high tension, unable to keep my thoughts concentrated for five minutes.

"That night I bought all the evening papers in the hope of finding fresh quotations. Our buying had already sent the shares up to six shillings, and my pulse danced with the thought that I had swayed the market. Next morning's *Herald* contained a telegram reporting an extraordinary crushing at our mine, and the rest of that day I was even more unfitted for business than the day before. But at ten past three the door swung open, and Johnstone strode in. He leaned across the counter and caught my hand:

"Best congratulations, old fellow. Market closed to-day with 'Green Cubs' at twenty-two and six, and selling like wildfire!"

I stared incredulously, and dropped my pen with a sort of paralysed laugh. However, I soon recovered. But the best is still to come, for three months later I sold out at 11½, and cleared a profit of something like nine thousand pounds; and my visits to the west end of the city assumed a business-like regularity. All the

same, I would not recommend any one to follow my example unless he too can get hold of a Green Cub. It's safe then—but—not otherwise.

THE MONTH:

SCIENCE AND ARTS.

THE recent celebration of Lord Kelvin's jubilee as Professor of Natural Philosophy in the University of Glasgow will long be remembered as an event of unusual interest and importance. Lord Kelvin's life-work covers such a wide field of knowledge that very few are able to gauge the immense value of his labours to mankind at large. A special feature of the late celebration, which took place in the presence of distinguished visitors from all parts of the world, was the exhibition of some of Lord Kelvin's principal inventions. Among them was the mirror galvanometer, without which long-distance submarine telegraphy would be next to impossible; models of his wonderful machinery for paying out and recovering deep-sea cables; his beautiful compass; and his deep-sea sounding apparatus. These inventions alone would guarantee lasting fame for any man, but Lord Kelvin is also noted for abstruse investigations of the highest order; and it is not too much to say that he has laid the whole world under an immense obligation for his untiring labours in the field of scientific research.

The last consular report from Naples alludes to an invention by Mr H. Linden, secretary to the Zoological Station at that port, which may possibly have some influence on the future of boat propulsion, although as yet it seems in its toy stage. Mr Linden, taking nature for his instructor, has fitted a boat with fins, which are fixed on outriggers projecting over the stem and stern of the vessel, and he finds that by their aid the boat can be propelled by the action of the waves. The rolling and pitching of a boat in a choppy sea, as well as the vertical action of the waves, will also help to work these fish-like appendages. At first the result was not encouraging, for the boat travelled only two kilometres (about $1\frac{1}{2}$ mile) per hour, but by careful adjustment of the fins this speed was soon greatly increased. A boat 14 feet in length was made to run at 5 kiloms. an hour in the Bay of Naples against a south-west wind, and nearly as fast against a north-east wind. It is said that the fins can be easily adjusted to any boat, and that they are inexpensive. It will be noted that this system is useless in still water.

An animal made of tinfoil, of the shape of an elongated fir cone, about three feet in length, which crackles and rustles with every movement, is one of the latest acquisitions of the Zoological Society of London. Its name is the Pangolin, or Scaly Ant-eater, and it belongs to the same family group as the Armadillo and Platypus. It has excited great attention at the 'Zoo,' for it is—if we are correctly informed—the first animal of the kind which has been exhibited there. Its home is where the termites, or white ants, are found; for the animal feeds on these destructive creatures, and possesses claws

which are designed to break down their strongholds. The claws are also necessary for burrowing in the ground, for the pangolin excavates a cave for himself and his mate eight feet or so below the surface of the earth, and in this strange home one or two young are produced every year. The pangolin at present at the 'Zoo' is fed upon ants and their eggs, and also exhibits a partiality for cockroaches scalded in milk. The scales with which its body is covered are hard and sharp as steel, and it can give a terribly cutting blow with its powerful tail. It can roll its body up into a ball like a hedgehog when it so wills.

The art of smuggling goods, so as to escape the Customs-duty, has been carried on to very great perfection; and all kinds of dodges have been adopted to hide articles from the vigilant eyes of the officers. It would seem, indeed, that every form of concealment had been practised, from simple hiding to the manufacture of articles out of contraband material; for instance, innocent-looking oil-cake, made in reality of compressed tobacco. But the American smuggler has lately found out a new method, albeit one which is rather risky, as the recent discovery shows. At New York an exhausted pigeon fell into the hands of the police, the reason of its failure to reach its home being that it carried a number of comparatively heavy diamonds, some under its tail, some on its legs, and others round its neck. Now there is, under the present United States tariff, a heavy duty upon these gems, and the police theory is that the intercepted pigeon is the property of a gang of smugglers, who regularly take birds to Europe, and when on the homeward voyage attach precious stones to them, which are purchased abroad, and set the birds free before the Customs scrutiny takes place.

The outcry of all humane people against the wanton destruction of bird life for purposes of personal adornment has so far affected the attitude of the retail traders in feathers, that some of them are selling artificial goods instead of the real article. Many ladies, who would scorn to place real feathers in their head-gear, are by such representations induced to buy so-called 'Osprey' feathers, a name which for some unknown reason is given in this trade to the delicate plumes of the small white herons or egrets. But, *caveat emptor*, the so-called 'artificial' plumes are in reality genuine plumes, which, let it be remembered, are only developed on these beautiful birds during the season in which they have their nests and young. It is to salve the consciences of their customers that the sellers make use of this unworthy subterfuge, and unless the practice be exposed, 'one of the most beautiful of birds'—we are quoting the words of Sir W. H. Flower, who has recently written a strong protest on this subject—'will be swept off the face of the earth, to minister to a passing fashion, bolstered up by a glaring falsehood.'

The great difficulty found in cities and large towns of disposing of the ever-increasing amount of waste products, rubbish, and animal and vegetable refuse, which find their way to the household dust-bins, has led to the extensive adoption of parish destructors, which are huge

furnaces in which this unhealthy matter is purified by fire and turned into harmless dust and ashes. A new destructor has recently been opened by the St Pancras (London) Vestry, where the ash and clinkers are converted into a valuable mortar and concrete; and where also an ambitious attempt is being made to utilise the gaseous products as a heating agent for raising steam. Adjoining the destructor premises is an electric lighting station, and the heat from the furnaces of the destructor is carried to the boilers next door. The system is at present under trial, and there is very much doubt whether it will prove successful. The refuse will most probably require the aid of coal to help it to come up to the standard necessary in a fuel for the raising of steam.

Carbolic acid is now so generally employed for disinfecting purposes that familiarity is apt to breed contempt for its highly corrosive and poisonous qualities; hence the value of knowing of a good and easily obtained antidote to its dangerous effects. Professor Carleton states that vinegar applied to a cutaneous or mucous surface which has been burned by the acid will immediately give relief, the characteristic bleaching of the skin quickly disappearing, and subsequent scarring being to a large extent prevented. It is also useful when the poison has been taken internally; and, unfortunately, large numbers of lives are lost annually through carbolic acid poisoning—chiefly cases of suicide. For internal administration the vinegar should be diluted with an equal quantity of water, and taken by the patient as soon as possible.

It was some time ago pointed out by Nordenskiöld, the Swedish scientist, that water might often be found by boring through granite and other crystalline rocks, his theory being that changes of temperature must cause shearing strains between the upper and lower layers, which would lead to fissures through which surface water would percolate. A well made in 1894 on the Swedish coast under such conditions is now yielding four thousand four hundred gallons of fresh water a day, and other wells have since been bored to about a similar depth (one hundred and ten feet) which give encouraging results. It is believed that many lighthouses and other outlying stations can be provided with fresh water by boring through the rocks upon which they are situated.

The transport from one end of the earth to the other of the most perishable articles of food is now becoming quite a common thing, and the plan usually adopted is that of the refrigerator. But recently quite a new method has been discovered of packing butter for shipment without the aid of ice or refrigerating machinery. The butter is packed in a box made of six pieces of ordinary glass, the edges being secured by strips of gummed paper. Over the glass is placed a layer of plaster of Paris, which, being a bad conductor of heat, preserves the butter at an even temperature. Butter packed in this way at Melbourne has been shipped to South Africa, and then taken seven hundred miles overland to Kimberley, where it has arrived in perfect condition. Cases holding as much as two hundredweight of butter are now being made for this new trade

departure. The cost of packing is about one penny per pound.

In a Government report from Colombia appears the description of a tree, known as the chaparro, which possesses the property of being fireproof. It grows on the vast plains of Colombia and the north of South America called savannas, extensive districts which are parched with heat, except during the rainy season. It has long been the custom to clear the ground for the new vegetation which springs up so luxuriantly on these plains after the rainy season by means of fire; and such fires, miles in extent, kindled by the herdsmen, destroy everything in the shape of vegetation except the chaparro tree, which survives to afford a welcome shade in an almost treeless region. It is a small tree, seldom growing to more than twenty feet in height, with a girth of about three feet, and it owes its protection from fire to the nature of its hard thick bark. The bark lies on the trunk in loose layers, which do not readily conduct heat to the more delicate parts of the structure. It is a general idea among the natives that this tree grows only where gold is abundant in the soil below. That it is common in auriferous districts is indisputable, but there is no ground for supposing that it does not grow elsewhere.

Every one who travels much by our railways will admit that, while there is much to admire in the way that they are officered and managed, there is room for reform. We do not allude here to the regular unpunctuality of certain lines, for that at present seems, for some obscure reason, to be irremediable. But there are various little matters in which the convenience and comfort of passengers might, with advantage to both customers and companies, be better secured than they are at present. For example, there is no reason why a return ticket, for which hard cash has been paid, should not be transferable as well as available at any time after issue. A step in the right direction has been taken by the North Eastern Railway Company in the issue of books of coupons for one thousand miles of travel, at a reduction of about twenty per cent. on the usual fares. But the privilege is confined to first-class passengers only, and is so hampered by red tape restrictions that we fear it will not be highly valued. Still it is a step in the direction of much-needed reform, and we look forward to the time when such books of tickets will be available at any time, for any person, and on any railway in the kingdom. Possibly railway officials will regard such a proposition as being impossible, if only on account of the forged tickets which would soon be in circulation. The same argument would apply to bank-notes, but no one would think of suggesting that because a note is forged now and again, the present system of paper currency should cease to be.

In a Belgian paper a wonderful story is told by M. Fiston, of certain observations which he has made upon the habits of eels. He had planted at a distance of about one hundred and fifty yards from the bank of a river where eels were plentiful, several plots of peas. As the peas reached maturity he noticed that some of the pods were gnawed through with an even clean

cut, and he at once attributed the damage to field mice. But his gardener one day informed him that he had visited the ground very early in the morning and saw several 'serpents' come from among the peas at his approach, and go to the river. The next morning M. Fiston himself went to the field, and threw a stone into the middle of the peas, when at once out came a dozen eels which fled towards the stream. It has long been known that eels will leave the water and take to land in search of insects, and they have also been said to eat cereals, but a diet of peas for such creatures is something new.

It is said that one of the latest products of the electric furnace is a compound of boron and carbon, which is so hard that it will cut glass as easily as will a diamond. The new substance is due to M. Moissan, who makes it by heating together boracic acid and carbon; it is black, and, unlike the diamonds made artificially some years ago, which were microscopic in size, the new material can be procured in large lumps. If this be true, the compound will be hailed by engineers as a valuable aid in the drilling of hard rocks.

At Blackpool, Lancashire, a new system of traction has been inaugurated on a tramway line which runs from that place to Lytham, a distance of six and a half miles. The novelty consists in the car carrying its own motor, which is an Otto gas-engine, driven by gas compressed in steel cylinders, which are carried beneath the vehicle. The cars weigh seven tons each, and can be driven at a speed of twelve miles an hour. Like many of the autocars now upon probation before the public, the engine in this car is kept going whether the car is in motion or whether it is standing still, the flywheel making two hundred and sixty revolutions per minute. The gas and air with which the cylinders are charged is ignited by means of an electric spark, and the working parts are kept cool by water circulation. The new car seems to be a great improvement upon previous attempts in the same direction, and it is alleged that the system is more economical in working than horse traction, steam, or electricity.

While so much is being done to reform our methods of highway travelling, it is interesting to turn back a few pages of history to see what was being done in the same direction by our forefathers. In 1802 the first tramway, or iron railway for horse traction, long before railways as we now know them were thought about, was laid between Wandsworth and Merstham in Surrey; and a large basin was made at Wandsworth to accommodate thirty barges which brought their freight *via* the Thames. There was a double line of rails, and 'points' were used to transfer the vehicles from one line to the other. Great surprise was evinced at the ease with which a single horse could draw immense weights on such a railway; and once, to settle a bet, an animal dragged twelve wagons loaded with stones, each wagon representing a weight of three tons, for six miles. A contemporary writer says: 'Notwithstanding the advantages of iron railways with respect to facility and motion, this road does not appear to be much used, nor is it probable that railways will ever come into general use.'

Mr Maxim, of Maxim-gun celebrity, is still sanguine as to the future of the flying-machine. It will be remembered that he has built a huge machine of this description which is driven by an enormously powerful steam-engine of comparatively light construction. He points out that until within the past six years, the experimenters with flying-machines were little better than charlatans and mountebanks, and that it is only quite recently that men of science have turned attention to the subject. In this way much valuable information has been gained from actual experiment, as opposed to mere theory. Mr Maxim believes that it is now possible to make a successful and practical flying-machine 'which will at least be a valuable adjunct to the offensive and defensive powers of highly-civilised nations, who are able to make and operate delicate and complicated machinery.'

An article in the *Journal* for June 1896 dealt with cider-making in England: since then the *Board of Trade Journal* has called attention to the cider industry in France, and to certain curious developments in Germany. Normandy is *par excellence* the country of cider. It was in Normandy first of European countries that cider was made into a wholesome and popular beverage. Normandy still holds that her ciders are the finest in the world. The cider product of France varies enormously from year to year. The recent average has been about 14,000,000 hectolitres per annum; but in 1893 the total was 31,600,000 hectolitres, in 1895 nearly 25,600,000—the average price being about ten francs per hectolitre (of twenty-two gallons).

In Germany, on the other hand, little cider is consumed, and German apples are not good for cider-making. But to this industry the Germans have applied themselves with the same insight, persistence, and technical skill as has enabled them in the last two decades to supersede England in many specifically English products. The Germans have verily entered into the cider harvest of France. They now import largely the best French apples (by train-loads at a time), and Germany now exports ten times as much cider as France (often as 'German champagne')—to Athens, Damascus, Calcutta, Cape-town, New York, San Francisco, Sydney, Buenos Ayres, Peking! The town of Frankfurt alone has fifty cider factories (five of them large), and the new industry is reported to bring into this one German town £500,000 per annum.

THE PANAMA CANAL AS IT IS.

THE West Indies, the Spanish Main, and the Central American isthmus hold a somewhat unique place in the world's history. Of no equal area of the planet, probably, are the annals so peculiarly a record of wild ambitions, tragic failures, piracy, treachery, decay, and death; and we hear but little of honest industry, peace, and prosperity. Two of the greatest disasters in the history of commercial and financial enterprise, separated by almost exactly two centuries, are associated with the same section of the American isthmus, at points one hundred and twenty miles apart. In 1695

the Scottish nation, under the influence of the far-sighted William Paterson, had apprehended the boundless possibilities of the isthmus as an *entrepôt* of the trade and commerce of the eastern and western hemispheres, and were with feverish and almost frantic eagerness planning the Darien scheme—a scheme which contemplated the digging of a canal between Atlantic and Pacific oceans. In 1698 the first colonists left Scotland. In 1703 the last miserable survivors of an utterly ruined enterprise reached home. Racial and religious hostility, Spanish enmity, and English jealousy, combined with a deadly climate and internal mismanagement to wreck the scheme.

The deadly climate and still worse mismanagement—amounting to criminal misuse of the funds collected—were active in ruining the great Panama Canal Scheme which, carried triumphantly through the initial difficulties by the creator of the Suez Canal, collapsed in bankruptcy and ignominy in 1893. Since 1889, when operations practically ceased, the stupendous canal works have been falling into utter ruin; and, being gradually absorbed again into tropical jungle, the impression they make on an eyewitness should not be devoid of interest.

The traveller by the inter-oceanic railroad from Colon to Panama has ample opportunity of surveying the wreck of the workings (the writer, fortunately, had extra facilities and time for a more perfect inspection); as, naturally, the course of both across the isthmus is confined to the lowest practicable levels, and intermingle with one another, as it were, the most of the distance, with the exception of the last two or three miles from each outfall.

To the voyager starting from the Atlantic coast, and passing the stations of Monkey Hill and Tiger Hill, perhaps a tithe of the innumerable last resting-places of the disease-stricken toilers still remain sufficiently conspicuous to force themselves on his attention; though of many hundreds, nay, thousands of graves, no traces are now visible, owing to the quick growth of vegetation, the total lack of kindly care, and the ravages of tropical insects amongst the rudely-constructed wooden crosses erected originally to the memory of the departed by a despairing friend or relative, who may himself have fallen a victim to a like fate a few days, even a few hours, later.

All along the route, thousands of tenantless, decaying edifices of deal and corrugated iron are grim reminders of the once vast multitudes who not long since dwelt therein. Over a million tons of machinery and plant, huge dredgers, locomotives, stationary engines, rust and rot under the pitiless influence of tropical rain and sunshine. Some, it is true, are protected as far as means and circumstances allow for possible future utilisation; but the mass lies uncared for. It is indeed a pitiful, awful scene of chaos for an engineer to gaze upon. We have even seen the sympathetic spectator in actual tears as the gigantic failure struck him with full force at first vision. Imagination falls far short in con-

jecting up the real state of things; personal observation alone can bring home the magnitude of the disaster.

On a fair estimate, from statistics at our disposal, and our own measurements, it would seem that fully a third of the excavating has been accomplished. But portions of the excavated section are rapidly refilling and being rendered useless from various causes, such as absence of protection works, and the deposits carried down by the Rio Chagres—a stream of scarcely imposing width, which, however, drains a large area, and has been known to rise as much as twenty-five to thirty feet in a few hours. Across the course of the Chagres the route of the canal continually cuts and recuts—an obvious source of difficulty, even in the rosier era of the enterprise.

On approaching the watershed and the cordillera crossing, the famous La Culebra Hill is reached. Here it was that the heaviest excavating had to be done; there for the first time the vastness of the undertaking becomes apparent. Though much has been accomplished, there still remain perhaps millions of tons of material to remove; owing to the irregular formation, the total amount can be but roughly estimated in any way. Fairly beyond that point, the digging of the remaining length of the canal to Panama, free from the assaults of the roaring Chagres, and amongst streams of no great importance, is perhaps child's play in comparison with the eastern slope section, though undoubtedly vast difficulties, natural and otherwise, beset the route.

Various huts along its course are still occupied, chiefly in the vicinity of the stations. Chinese, French, and odd members of innumerable nationalities, infinitesimal fractions of that once great human mass, still hang on in hopes of a future 'boom,' and eke out a precarious existence, or 'die in the meantime. And here and there, at various points on the line, a passing glimpse through the window of what was once a sectional engineer's headquarters, displays shelves loaded with myriad plans, dusty and insect-eaten, untouched for more than half a decade. A solitary, emaciated French sentinel awaits the distant time when they may again be brought into requisition. The words of one official struck me forcibly. 'Ah, m'sieu,' he said, 'the original idea of many was the construction of the canal, but with the majority of all concerned the main aim was the amassing of as much money, by fair means or foul, in as short a space of time as possible, that they might disappear from the scene before death or exposure overtook them.'

Undoubtedly the scenes of vice, misery, and debauch in Panama, during these few years, were indescribable. Engineers holding responsible positions were rarely at their duties, and spent their time in the city gambling and otherwise occupied in killing time, and ultimately themselves. Those who, by any possible chance, could absent themselves from the workings proper did so; for fever, consequent on the overturning of tropical virgin soil, was rampant, especially the Chagres variety, now practically extinct. But this was fleeing one evil to court another, as deadly, though less rapid in effect.

Time-keepers and gangers, having perhaps the names of seven hundred to one thousand men on their lists, still drew the corresponding payments for distribution, though thirty to forty per cent. of the supposed workers were under the sod, the surplus going to their own pockets. There was no one to check their methods, and nobody cared. Money was plentiful while it lasted. Every one was well paid, and it was a case of easy come and easy go. A conductor on the Panama Railroad volunteered the information that in the palmy days few or practically no tickets were issued. The regular fare for any distance was from seven to ten dollars gold, half of which, perhaps, reached the coffers of the company, whilst the other filled the pockets of the collector.

It is a well-known fact that European firms of contractors netted no insignificant sums out of the enterprise, and yet never had a practical finger in its development. Original contracts from the *Compagnie Canal du Panama* were disposed of, let and sublet as many as five and six times. Presuming that the actual operator in these instances made it pay (as the intermediate holders naturally retained a liberal percentage), the original terms must have been truly generous.

After these authenticated details, one can wonder but little at the ultimate catastrophe. A deadly climate, over-sanguine hopes, the utter absence of efficient management, with the resulting temptations and scope for the practice of countless irregularities and crimes, accomplished the disastrous end in due course. The following is a signal instance of sinful waste and swindling. A Belgian firm had contracted to supply several hundred light locomotives for use in the excavations. These on being erected proved absolutely worthless, mere bundles of scrap-iron, and immovable by the action of steam. Consequently over three hundred of these machines were dumped into the sea as foundation for the erection of a mole at the Atlantic outlet. Over them stand, as fitting memorials of the interment, the once semi-palatial residences of M. de Lesseps' ill-fated son and other high officials, now in various stages of decay, and inhabited by swarms of natives, West India blacks, and Chinese.

It is maintained by some that there may still be a possibility of achievement for the canal, and that all is not yet at an end. But its successful conclusion would be a marvel. The Suez Canal never had the same engineering difficulties or climatic disadvantages to overcome. Besides, a new canal is being industriously promoted at present. Opinions differ as to its feasibility and prospects. It has some advantages over a Panama route; it has not the Chagres river and its floods to contend with, and has free navigation along the whole length of Lake Nicaragua. But the climatic conditions are hardly more favourable; two very high ridges have to be pierced by cuttings, and the scheme has some difficulties of its own, so that Mr Colquhoun is probably not wrong in thinking that the estimate of £20,000,000 falls far below the sum that would ultimately be required for completing a canal by the Nicaragua route.

THE MODERN TITYRUS.

'Tityre, tu, recubans.'—VIRGIL.

With a carelessly calm composure,
I lie in the grassy enclosure,
And in delicate, dainty, diaphanous gushes
The smoke from my *brûle-gueule* is rolled:
The circle of trees round me planted
By summer's green wand is enchanted,
And the red-laden, white-laden, mauve-laden bushes
Beyond it are sweet to behold.
And whoso goes past me, me spying,
May the 'ease without dignity' mark
Of the latter-day Tityrus, lying
Long-stretched in the Kennington Park!

How close to one's memory lingers
The charm of that choicest of singers
Of old-time, whose gold-time (the bold time of wooing)
Was passed in the beech-casten shade;
Who, piping with shepherdly skill his
Fond love for his fair Amaryllis,
Set soft echoes, suave echoes, sweet echoes cooing
The name of that beautiful maid!
But the olden-time Tityrus, crazing
The woods with his love-litten spark,
Less blest was then I, lightly lazing,
Long-stretched in the Kennington Park!

In the music the love-passion teaches
(Such Tityrus made to the beeches)
Dark undernotes, deep 'neath the wonder-notes creeping,
Change gladness to sadness anon:
But the eyes of me fortunate glisten
With bliss which endures, as I listen
To glee-notes that, glibly from glee-founts upleaping,
Sink, soothing, my senses upon.
And my heart, proof to love-pangs, rejoices,
As, making no music, I hark
To that music of juvenile voices
Which thrills through the Kennington Park!

The strains by old Tityrus lifted
Were far through the beech-branches drifted;
But his measure, his treasure, his pleasure were merely
The offspring from Selfishness grown.
So hear ye the song, O my brothers,
Which, glad from the gladness of others,
I'm raising, here lazing, through gazing so cheerly
On infantile antics—and own
That the former-day Tityrus, plying
His reed, was less worthy of mark
Than the latter-day Tityrus, lying
Long-stretched in the Kennington Park!

WM. EDMONDSON.

*. TO CONTRIBUTORS.

- 1st. All communications should be addressed to the Editor, 339 High Street, Edinburgh.
- 2d. For its return in case of ineligibility, postage-stamps should accompany every manuscript.
- 3d. To secure their safe return if ineligible, ALL MANUSCRIPTS, whether accompanied by a letter of advice or otherwise, should have the writer's Name and Address written upon them in FULL.
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